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United States Air Force

Environmental Restoration Program



Construction Cost Estimate

Pilot Study - Fire Training Area (OU8)

**Loring Air Force Base
Limestone, Maine
Operable Unit 8**

December 1994

AQ *MOI-03-0727*

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**PRELIMINARY (45%)
CONSTRUCTION COST ESTIMATE**

PILOT STUDY

FIRE TRAINING AREA

**LORING AIR FORCE BASE
LIMESTONE, MAINE**

OPERABLE UNIT 8

CONTRACT NO. F41624-94-D-8054

DELIVERY ORDER NO. 0001

Prepared For:

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

BROOKS AIR FORCE BASE, TEXAS

Prepared By:

URS CONSULTANTS, INC.

DECEMBER 1994

**LORING AIR FORCE BASE
PILOT STUDY - FIRE TRAINING AREA
CONSTRUCTION COST ESTIMATE**

TABLE OF CONTENTS

- EXPLANATORY NOTES
- COST SUMMARY
- DETAILED COST ESTIMATE BREAKDOWN
- QUANTITY BACKUP
- UNIT PRICE BACKUP

COST ESTIMATE SUMMARY		INVTATION/CONTRACTOR	EFFECTIVE PRICING DATE	DATE PREPARED
PROJECT:	PILOT STUDY - FIRE TRAINING AREA	CODE (Check one) A <input type="checkbox"/> X <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> OTHER <input type="checkbox"/>	DRAWING NO.	SHEET 1 OF 1 SHEET
LOCATION:	LORING AIR FORCE BASE - LIMESTONE, MAINE		ESTIMATOR M.J.W.	CHECKED BY R.P.T.

The following are explanatory notes on the preparation of this construction estimate for 45% Design completion phase.

- Individual costs are Summar 1994 dollars.
- Unit costs with a Source of Cost indicated as "BID" are based on the average bid price of a minimum of five contractor bids for similar work items in New York City. Costs are totals with Overhead and Profit included.
- Unit cost with a Source of Cost indicated as "MEANS" are based on R.S. Means Company, Inc. 1994 Reference Books. Overhead and Profit are applied on the Summary Sheet (sheet 1 of 11) Overhead and Profit are assumed to be a total of 20% for this level estimate.
- This estimate is organized by construction items or major action, not by specification section or design discipline.
- Assume a three (3) month Construction Period for this 45% Design; subject to further review in the 90% Design.
- Lump Sum cost for electrical work assumed at \$125,000 for this 45% Design. Cost assumption is based on previous costs for similar work. A detailed cost break down will be provided with 90% Design.
- Level of safety for all operations is assumed to be Level "D".

**LEVEL B
CONSTRUCTION COST ESTIMATE
PILOT STUDY - FIRE TRAINING AREA
45% DESIGN
LORING AIR FORCE BASE
LIMESTONE, MAINE**

SUMMARY

Total Estimated Construction Costs (labor efficiency included)	\$ 1,015,756.71
Level of personal protection required included in items.	\$ 0.00
Estimated Construction Cost (Rounded to nearest \$100)	\$ 1,015,800
Bid Contingency 15%	\$ 152,400
Quality Assurance 1%	\$ 10,200
Supervision & Administration 8%	\$ 81,300
Engineering & Design 1.5%	\$ <u>15,200</u>
Total Budget Costs	\$ 1,274,900

DETAILED COST ESTIMATE BREAKDOWN

COST ESTIMATE SUMMARY		INVITATION/CONTRACTOR		EFFECTIVE PRICING DATE		DATE PREPARED		
PROJECT: PILOT STUDY - FIRE TRAINING AREA		CODE (Check one) A X B C		DRAWING NO.		SHEET 1 OF 11 SHEET		
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE		OTHER		ESTIMATOR M.J.W.		CHECKED BY R.P.T.		
TASK DESCRIPTION	QUANTITY		LABOR		EQUIPMENT		TOTAL	SOURCE OF COST
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST		
SUMMARY OF ITEMS:								
PROCESS INSTALLATION:								
GENERAL CONSTRUCTION: (from sheet 2 of 11)							\$169,375.48	
EQUIPMENT: (from sheet 4 of 11)							\$459,100.92	
PIPING, VALVES AND FITTINGS: (from sheet 7 of 11)							\$45,440.50	
SUBTOTAL PROCESS INSTALLATION							\$673,916.90	
TREATMENT BUILDING CONSTRUCTION: (from sheet 10 of 11)							\$107,521.39	
ELECTRICAL WORK: (from sheet 11 of 11)							\$125,000.00	
SUBTOTAL							\$906,438.29	
MOBILIZATION/DEMOLITION:								
ADJUSTMENT FOR MEANS PRICING:		20%					\$93,372.95	
TOTAL CONSTRUCTION COSTS							\$1,015,756.71	

COST ESTIMATE SUMMARY														DATE PREPARED	
PROJECT: PILOT STUDY - FIRE TRAINING AREA														12/14/94	
LOCATION: LORING AIR FORCE BASE - LIMESTONE ,MAINE														SHEET 2 OF 11 SHEET	
INVITATION/CONTRACTOR														CHECKED BY	
CODE (Check one)														R.P.T.	
A X B C															
ESTIMATOR															
M.J.W.															
TASK DESCRIPTION	QUANTITY			LABOR			EQUIPMENT			COST	UNIT PRICE	COST	TOTAL	SOURCE OF COST	
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST							
PROCESS INSTALLATION:															
GENERAL CONSTRUCTION:															
General Excavation	60	CY											\$4,791.60	BID	
Trenching	640	CY											\$32,832.00	BID	
Sawcutting Pavement	50	LF											\$724.00	BID	
Crushed Stone Backfilling	126	CY											\$7,382.34	BID	
General Backfilling	420	CY											\$3,780.00	MEANS	
Asphalt Restoration	50	SF											\$336.50	BID	
Recovery Well Installation	186	LF											\$45,224.04	BID	
Re-injection Well Installation	189	LF											\$12,285.00	QUOTE	
Painting	500	SF											\$1,750.00	BID	
Recovery Trench Blasting	1	LS											\$60,000.00	QUOTE	
Clearing and Grubbing	0.1	ACRE											\$270.00	MEANS	
Total General Construction														\$169,375.48	

COST ESTIMATE SUMMARY										INVIATION/CONTRACTOR		EFFECTIVE PRICING DATE		DATE PREPARED	
PROJECT: PILOT STUDY - FIRE TRAINING AREA										CODE (Check one) A X B C		DRAWING NO.		SHEET 3 OF 11 SHEET	
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE										ESTIMATOR M.J.W.		CHECKED BY R.P.T.			
TASK DESCRIPTION	QUANTITY		LABOR		EQUIPMENT		UNIT PRICE	COST	TOTAL	SOURCE OF COST					
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST									
PROCESS INSTALLATION:															
EQUIPMENT:															
Oil/water Separator	1	LS					\$29,149.40		\$29,149.40	BID					
Shallow Tray Air Stripper	1	LS					\$64,507.30		\$64,507.30	BID					
55 Gallon Drums	10	EA					\$125.57		\$1,255.70	BID					
Horizontal Centrifugal Pump	2	EA					\$7,786.27		\$15,572.54	BID					
Sludge Pump	1	EA					\$2,300.81		\$2,300.81	BID					
Product Holding Tank	1	EA					\$3,486.32		\$3,486.32	BID					
Groundwater Depression Pump	3	EA					\$4,980.09		\$14,940.27	BID					
Product Recovery Pump	3	EA					\$6,900.00		\$20,700.00	BID					
Duct Heater	1	EA					\$2,916.02		\$2,916.02	BID					
Flow Meter - 1"	3	EA					\$2,832.29		\$8,496.87	BID					
Flow Meter - 4"	1	EA					\$4,300.06		\$4,300.06	BID					
SUBTOTAL									\$167,625.29						

COST ESTIMATE SUMMARY										INVIATION/CONTRACTOR		EFFECTIVE PRICING DATE		DATE PREPARED	
PROJECT: PILOT STUDY - FIRE TRAINING AREA										CODE (Check one) ___ A ___ X ___ B ___ C ___ OTHER		DRAWING NO.		SHEET 4 OF 11 SHEET	
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE												ESTIMATOR M.J.W.		CHECKED BY R.P.T.	
TASK DESCRIPTION	QUANTITY		LABOR			EQUIPMENT		COST	UNIT PRICE	COST	UNIT PRICE	COST	TOTAL	SOURCE OF COST	
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE								COST
PROCESS INSTALLATION:															
EQUIPMENT: (Continued)															
Level Sensors	20	EA									\$1,073.88		\$21,477.60	BID	
Pressure Sensors	1	EA									\$673.12		\$673.12	BID	
Pressure Gauges	6	EA									\$410.86		\$2,465.16	BID	
Motor Operated Valves	3	EA									\$1,500.00		\$4,500.00	BID	
Programmable Logic Controller (PLC)	1	LS									\$27,010.58		\$27,010.58	BID	
IBM- Compatible Computer	1	LS									\$6,346.23		\$6,346.23	BID	
START-UP, OPERATION & TESTING															
Oil/water Separator	1	LS									\$116,336.57		\$116,336.57	BID	
Shallow Tray Air Stripper	1	LS									\$112,664.37		\$112,664.37	BID	

COST ESTIMATE SUMMARY										INVTATION/CONTRACTOR	EFFECTIVE PRICING DATE	DATE PREPARED
PROJECT:	PILOT STUDY - FIRE TRAINING AREA									CODE (Check one) _ A _ X _ B _ C _ OTHER	DRAWING NO.	SHEET 5 OF 11 SHEET CHECKED BY R.P.T.
LOCATION:	LORING AIR FORCE BASE - LIMESTONE, MAINE									ESTIMATOR M.J.W.		
TASK DESCRIPTION	QUANTITY			LABOR			EQUIPMENT		MATERIAL		TOTAL	SOURCE OF COST
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST	UNIT PRICE	COST		
PROCESS INSTALLATION:												
PIPING, VALVES AND FITTINGS:												
PIPING:												
3/8" - Flexible Hose	210	LF							\$14.16		\$2,973.60	BID
1" - PVC	30	LF							\$10.54		\$316.20	BID
2" x 3" - PVC	250	LF							\$12.26		\$3,065.00	MEANS
2" - PVC	345	LF							\$12.67		\$4,371.15	BID
3" - PVC	10	LF							\$19.25		\$192.50	BID
4" - PVC	840	LF							\$17.49		\$14,691.60	BID
4" - Flexible Hose	210	LF							\$20.07		\$4,214.70	MEANS
VALVES & FITTINGS:												
3/8" - Check Valve	3	EA							\$75.20		\$225.60	MEANS
3/8" x 1" Reducer	3	EA							\$202.06		\$606.18	MEANS
SUBTOTAL											\$30,656.53	

COST ESTIMATE SUMMARY										EFFECTIVE PRICING DATE		DATE PREPARED			
PROJECT: PILOT STUDY - FIRE TRAINING AREA										DRAWING NO.		SHEET 6 OF 11 SHEET			
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE										ESTIMATOR		CHECKED BY			
										M.J.W		R.P.T.			
INVITATION/CONTRACTOR										EQUIPMENT		TOTAL		SOURCE OF COST	
CODE (Check one)										UNIT PRICE		COST			
A X B C															
OTHER															
LABOR										EQUIPMENT		TOTAL		SOURCE OF COST	
QUANTITY										UNIT PRICE		COST			
NO. OF UNITS										UNIT PRICE		COST			
MH UNITS										UNIT PRICE		COST			
TOTAL HRS										UNIT PRICE		COST			
TASK DESCRIPTION										UNIT PRICE		COST			
PROCESS INSTALLATION:															
PIPING, VALVES AND FITTINGS: (Continued)															
VALVES & FITTINGS: (Continued)															
1" PVC Ball Valve										\$75.20		\$451.20		BID	
1" x 2" PVC Reducer										\$10.54		\$63.24		BID	
2" Check Valve										\$199.42		\$598.26		BID	
2" PVC Ball Valve										\$181.97		\$1,091.82		BID	
2" PVC Elbow										\$41.91		\$628.65		BID	
2" PVC Tee										\$26.59		\$159.54		BID	
2" x 3" PVC Elbow										\$161.85		\$971.10		MEANS	
2" x 3" PVC Tee										\$183.50		\$367.00		MEANS	
3" PVC Elbow										\$48.20		\$289.20		MEANS	
3" PVC Ball Valve										\$133.78		\$133.78		MEANS	
SUBTOTAL												\$4,753.79			

COST ESTIMATE SUMMARY																	INVOITATION/CONTRACTOR		EFFECTIVE PRICING DATE		DATE PREPARED	
PROJECT: PILOT STUDY - FIRE TRAINING AREA																	CODE (Check one) ___ A ___ X ___ B ___ C ___ OTHER		DRAWING NO.		SHEET 8 OF 11 SHEET	
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE																	ESTIMATOR M.J.W.		CHECKED BY R.P.T.			
TASK DESCRIPTION	QUANTITY			LABOR			EQUIPMENT		COST		UNIT	PRICE	COST	TOTAL	SOURCE OF COST							
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST														
TREATMENT BUILDING CONSTRUCTION																						
Clearing and Grubbing	0.1	ACRES									2700.00			\$270.00	MEANS							
Excavation	506	CY									\$8.00			\$4,048.00	MEANS							
Ordinary Backfill	422	CY									\$9.00			\$3,798.00	MEANS							
Crushed Stone Backfill (10" Thick)	117	SY									\$9.00			\$1,053.00	MEANS							
Perimeter Insulation	504	SF									\$0.62			\$312.48	MEANS							
Vapor Barrier	11	SF									\$12.00			\$132.00	MEANS							
Concrete Form Work	2273	SF									\$5.40			\$12,274.20	MEANS							
Reinforcing	9000	L.B									\$0.60			\$5,400.00	MEANS							
Concrete for Foundation	48	CY									\$101.50			\$4,872.00	MEANS							
Concrete Slab	33	CY									\$92.00			\$3,036.00	MEANS							
Curing	3441	SF									\$3.28			\$11,286.48	MEANS							
Grout Under Column Base	8.5	SF									\$11.00			\$93.50	MEANS							
SUBTOTAL																				\$46,575.66		

COST ESTIMATE SUMMARY										INVTATION/CONTRACTOR		EFFECTIVE PRICING DATE		DATE PREPARED	
PROJECT: PILOT STUDY - FIRE TRAINING AREA										CODE (Check one) ___ A ___ X ___ B ___ C ___ OTHER		DRAWING NO.		SHEET 9 OF 11 SHEET	
LOCATION: LORING AIR FORCE BASE - LIMESTONE, MAINE												ESTIMATOR M.J.W.		CHECKED BY R.P.T.	
TASK DESCRIPTION	QUANTITY		LABOR		EQUIPMENT		COST		UNIT PRICE	COST	TOTAL	SOURCE OF COST			
	NO. OF UNITS	UNIT MEAS	MH UNITS	TOTAL HRS	UNIT PRICE	COST	UNIT PRICE	COST							
TREATMENT BUILDING CONSTRUCTION (CONT.)															
Embedded Steel	314	LB													
Anchor Bolts															
5/8" Dia	20	EA							\$6.15		\$123.00	MEANS			
3/4" Dia.	16	EA							\$8.20		\$131.20	MEANS			
Expansion Anchor	74	EA							\$4.74		\$350.76	MEANS			
Structural Steel	12	TON							\$1,513.00		\$18,156.00	MEANS			
Sag Rod	63	LB							\$2.82		\$177.66	MEANS			
Insulated Metal Roof	1296	SF							\$9.10		\$11,793.60	MEANS			
Metal Siding	2326	SF							\$8.50		\$19,771.00	QUOTE			
Double Leaf Door	1	EA							\$600.00		\$600.00	MEANS			
8' x 10' Roll Up Door	1	EA							\$2,600.00		\$2,600.00	QUOTE			
Louver	2	EA							\$2,300.00		\$4,600.00	BID			
Motorized Exhaust	1	EA							\$1,100.00		\$1,100.00	BID			
SUBTOTAL													\$59,874.22		

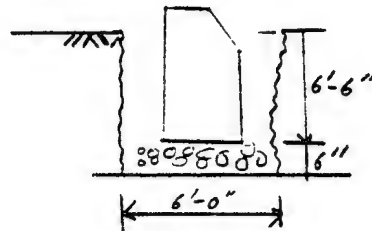
QUANTITY BACK-UP

PROJECT Loring AFB - Qu-8
 SUBJECT Pilot Study Design
 COST Estimate - Quantity

Excavation:

REF.
PAGE

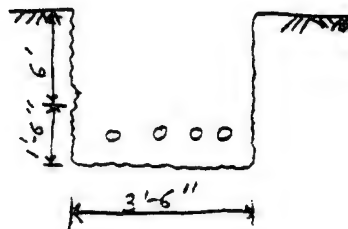
PRECAST MANHOLE:



$$6' \times 6' \times 7' = 252 \text{ ft}^3 \times \frac{1}{27} = 9.3 = 10 \text{ cy}$$

$$10 \text{ cy} \times 6 \text{ Manholes} = 60 \text{ cy}$$

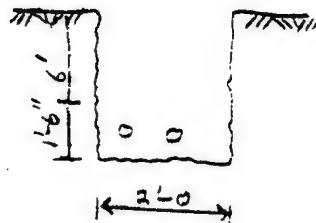
INFLUENT PIPE/CONDUIT:



$$7'-6'' \times 3'-6'' \times 230' = 6037.5 \text{ ft}^3 \times \frac{1}{27} \\ \Rightarrow 223.6 \Rightarrow 225 \text{ cy}$$

Allow 20% over excavation for
bracing $225 \text{ cy} + 20\% = 270 \text{ cy}$

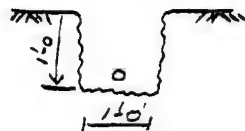
EFFLUENT PIPE/CONDUIT:



$$7'-6'' \times 2'-0'' \times 485' = 7275 \text{ ft}^3 \times \frac{1}{27} \\ \Rightarrow 269.4 \Rightarrow 270 \text{ cy}$$

Allow 20% over excavation for
bracing $270 + 20\% = 324 \Rightarrow 325 \text{ cy}$

Monitoring Well conduit:



$$1'-0 \times 1'-0 \times 1180 = 1180 \text{ ft}^3 \times \frac{1}{27} = 43.7 \text{ cy}$$

$$\Rightarrow 45 \text{ cy} \checkmark$$

URS CONSULTANTS, INC.

PAGE OF
SHEET NO. 2 OF 2
JOB NO. A10000106205
MADE BY MML DATE 12/10/98
CHKD. BY TAO DATE 12/10/98

PROJECT Loring AFB, RU-8
SUBJECT Pilot Study Design
Cost Estimate - Quantity

REF.
PAGE

Sawcutting:

Access Road: $25' \times 2' = 50 \text{ LF}$

Crushed Stone:

Precast Manholes = $6' \times 6' \times 1/2' = 18 \text{ ft}^3 \times 1/27 = 0.67 \text{ cy} \times 6 = 4 \text{ cy}$

Influent Pipe/Conduit = $1'-6" \times 3'-6" \times 230' = 1207.5 \text{ ft}^3 \times 1/27 = 44.7 = 74.5 \text{ cy}$

Effluent Pipe/Conduit = $1'-6" \times 2'-0" \times 485' = 1455 \text{ ft}^3 \times 1/27 = 53.8 = 75.5 \text{ cy}$

Monitoring Well Conduit = $6" \times 1'-0" \times 1180' = 590 \text{ ft}^3 \times 1/27 = 21.8 = 22 \text{ cy}$

Total = 126 cy

Asphalt Restoration:

Access Road: $25' \times 2' = 50 \text{ SF}$

Clearing & Grubbing:

Recovery Trench = $60' \times 20' = 1200 \text{ SF}$

Piping Trench = $170' \times 10' = 1700 \text{ SF}$

Total = 2900 SF \Rightarrow say 3000 SF / 43560 = 0.1 ACRE

Note: For Equipment & Piping Direct take offs from plans and specs were used.

General Backfilling

Influent Pipe/Conduit = $6'-0" \times 3'-6" \times 230' = 4830 \text{ ft}^3 \times 1/27 \approx 180 \text{ cy}$

Effluent Pipe/Conduit = $6'-0" \times 2'-0" \times 485' = 5820 \text{ ft}^3 \times 1/27 \approx 215 \text{ cy}$

Monitoring well conduits = $6" \times 1'-0" \times 1180' = 22 \text{ cy}$

Total $\approx 420 \text{ cy}$

PROJECT Loring AFB.
 SUBJECT Process Building.
 ESTIMATE OF QUANTITIES.

SHEET NO. OF

JOB NO.

MADE BY PP DATE 12/8/94

CHKD. BY KW DATE 12/9/94

REF.
PAGEPROCESS BUILDING

I. STRUCTURAL STEEL.

Roof

Weight.

$$W 8 \times 18 = 3 \times 5 \times 16.67 \times 18 = 4501$$

$$\text{Beams on line ① and ④} = 2 \times 2 \times 10 \times 18 = 720$$

$$\text{Beams on line ② and ③} = 2 \times 20 \times 30 = 1200$$

Roof bracing.

$$3 \times 2\frac{1}{2} \times \frac{1}{4} = 2 \times 4 \times 19.5 \times 4.5 = 702$$

$$L = \sqrt{10^2 \times 16.67^2} = 19.44 \times 19.5$$

$$\text{Addl framing } C 6 \times 8.2 = 12 \times 8.2 = 98.4$$

$$L = 10 + 2 = 12$$

COLUMNS

$$W 8 \times 18 \text{ Line A} = 4 \times 16.5 \times 18 = 1188.0$$

$$W 8 \times 18 \text{ Line B} = 2 \times 16.25 \times 18 = 585.0$$

$$W 8 \times 18 \text{ Line C} = 4 \times 16 \times 18 = 1152.0$$

Base Pl.

$$4 - 8 \times 10 \times \frac{3}{4} = 4 \times \frac{8}{12} \times \frac{10}{12} \times 30.6 = 68.0$$

$$6 - 8 \times 10 \times \frac{5}{8} = 6 \times \frac{8}{2} \times \frac{10}{2} \times 25.5 = 85.0$$

Bracing Vertical on Line A & C

$$3 \times 2\frac{1}{2} \times \frac{1}{4} \text{ Length} = 2 \left(\sqrt{16.67^2 + 6.42^2} \right) + 2 \left(\sqrt{16.67^2 + 10^2} \right)$$

on each side.

$$= 2 \times 17.86 + 2 \times 19.5 = 75$$

Weight

$$= 2 \times 75 \times 4.5 = \frac{675}{\Sigma 10974.}$$

PROJECT Loring AFB
 SUBJECT PROCESS Building
 Estimate of Quantities

SHEET NO. OF

JOB NO.

MADE BY PP DATE 12/8/94

CHKD. BY KW DATE 12/9/94

BF from Page 1 = 10974.40^{lb} REF. PAGE

Vertical bracing on line 1 and 4.

$$L_1 = \sqrt{10^2 + 10^2} = 14.14$$

$$L_2 = \sqrt{10^2 + 6.42^2} = 11.88$$

$$\text{Total length} = 2 \times (28.5 + 24)$$

$$\text{both side} = 2 \times 52.5 = 103' \quad 105$$

$$\text{Weight} = 103 \times 4.5 = 463.50$$

Perimeter beam - W8x18.

$$\text{Total length} = 2 \times 3 \times 16.67 + 2 \times 2 \times 10$$

$$= 140$$

$$\text{Weight} = 140 \times 18 = 2520 \text{ lbs}$$

Girts.

Eave Girt on line AEC

$$C 8 \times 11.5 + C 6 \times 8.2 \quad 12 = 19.7' \text{ ft}$$

$$\text{Wt} \quad 2 \times 52 \times 19.7 = 2049.0 \text{ lbs.}$$

Girts on line C -
 $C 8 \times 11.5$

$$2 \times 52 \times 11.5 = 1196$$

Perimeter angle $3 \times 3 \times 1/4$

$$1 \times 4.9 \times 52 = 255$$

Girts on line A

$$2 - C 8 \times 11.5$$

$$2 \times 11.5 \times 52 = 1196$$

$$2 \text{ Girt post } 12' - 6' 1/2$$

$$2 \times 11.5 \times 12.5 = 287.5$$

$$2 \text{ Girt post } 7' - 2' 1/2$$

$$2 \times 11.5 \times 7.17 = 165.0$$

$$1 \text{ hor. } 5' - 4' 1/2$$

$$1 \times 11.5 \times 5.37 = 62.0$$

Perimeter angle $3 \times 3 \times 1/4$

$$52 - 5.37 - 10 = 36.63$$

$$36.63 \times 4.9 = 179.5$$

$$\text{Tot} \quad 19347.9 \text{ lbs}$$

PROJECT Loring AFB
 SUBJECT Process Building
 Estimate of Quantity

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BF from Page 2

19348.0 lbs. REF. PAGE

Girt on line ① E' ④

C 8x11.5

$$\text{Total length on line ①} = 3 \times 11 + 4 \times 11 + 2 \times 4 = 85'$$

$$\text{Length for line ① E' ④} = 2 \times 85 = 170$$

$$\text{Weight} = 11.5 \times 170$$

$$= 1955 \text{ lbs}$$

$$\text{Perimeter angle } 2 \times 22 \times 4.9$$

$$3 \times 3 \times \frac{1}{4}$$

$$= 216 \text{ lbs}$$

$$21519$$

Add 10% for Conn. etc.

$$2151$$

$$23670 \text{ lbs}$$

ie Use 12 ton.

$$\text{Sag rod } 5/8" \Phi \quad \text{Total length} = 6 \times 10 = 60'$$

$$\text{Wt} = 60 \times 1.043 = 63 \text{ lbs.}$$

Calculation E_g roof.

$$\text{Area of top Standing Seam deck} = 54 \times 24 = 1296 \text{ sq ft}$$

$$\text{Insulation} = 53 \times 23 = 1219 \text{ sq ft}$$

$$\text{Vapor barrier} = 53 \times 23 = 1219 \text{ sq ft}$$

$$\text{Bottom Deck 22g} = 53 \times 23 = 1219 \text{ sq ft}$$

$$\text{Perimeter flashing} = 2 \times 54 + 2 \times 24 = 156'$$

$$\text{Gutter horizontal} = 540$$

$$\text{Vertical Drain } 4" \Phi = 2 \times 16 = 32'$$

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Sandwich Panel siding.

$$\text{Line A} = 16.42 \times 53 - 10 \times 7.5 - 6.33 \times 5.37 = 762 \text{ sq ft}$$

$$\text{Line C} = 16 \times 53 = 848 \text{ sq ft}$$

$$\text{Line 1 and 4} = 2 \times 23 \times 16.25 - 2(4 \times 4) = 716 \text{ sq ft}$$

$$\text{Total Siding area} = 2326 \text{ sq ft}$$

Louver 4x4 Electrically operated 2 NOS.

Double leaf Insulated Metal Door and frame 1 NO.
5' x 7' 6"

Garrage - Roll up Door push type 1 NO.
insulated

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1. Clearing and grubbing

$$L = 50 + 7 + 4 + 13 + 10 = 84$$

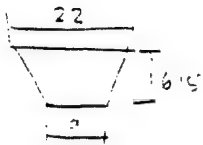
$$B = 20 + 4 + 4 + 23 = 51$$

$$\text{Area} = 84 \times 51 = 4284 \text{ sf}$$

2. Excavation Line 1 and 4

$$b_w = 5' - 4 + 3' - 8 = 9$$

$$b_L = 24 + 4 + 2 \times 6.5 = 41$$



$$\text{Top width} = 9 + 6.5 + 6.5 \quad \text{Top } L = 41$$

$$A_1 = 9 \times 22 = 252$$

$$A_2 = 41 \times 22 = 902 \text{ sf}$$

$$\text{Vol} = \frac{h}{3 \times L} (A_1 + A_2 + \sqrt{A_1 A_2})$$

$$= \frac{6.5}{3 \times 27} (252 + 902 + \sqrt{252 \times 902}) = 130.86$$

Line A to C

$$\text{For line 1 and 4} = 2 \times 131 = 262 \text{ yd}$$

$$\text{bottom width} = 7'$$

$$L = 50 - ((16 + 2 + 8.25) \times 2) \quad \text{Top width} = 13 + 7 = 20$$

$$= 50 - 13.84 = 36.16$$

$$\text{VOL for Line A to C} = 2 \times \left(\frac{20 + 7}{2} \right) \times 6.5 \times 36.16 / 27$$

$$= 235.04 \text{ yd}$$

$$\text{for Slab } 10'' \text{ deep} = 84 \times \frac{36.16}{27} \times 8 = 9.0$$

$$\text{Total volume of excavation} = 262 + 235 + 9$$

$$= 506 \text{ yd}$$

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Concrete quantity Foundation.

$$\text{Foundation} - \frac{4 \times 4 \times 1.25 \times 6}{27} = 4.45 \text{ ycd.}$$

$$\text{Type C} - \frac{2 \times 14 \times 1.25 \times 5}{27} = 6.482 \text{ ycd.}$$

$$\begin{aligned} \text{Wall on top of C} &= 2(1 + 1.33 + 8.67) \times (7.6 - 1.25) \times 1/27 \\ \text{Type foundn} &= 2 \times 11 \times 6.25 \times 1/27 = 5.003 \text{ ycd.} \end{aligned}$$

$$\text{Pier A1 and A-4} = \frac{2 \times 6.25 \times 2 \times 1.84}{27} = 1.70 \text{ ycd.}$$

$$\text{Pier B-1, B-4} = \frac{2 \times 1.33 \times 2 \times 6.25}{27} = 1.232 \text{ ycd}$$

$$\text{Pier C-1 \& C-4} = \frac{2 \times 2 \times 1.84 \times 6.25}{27} = 1.70 \text{ ycd}$$

$$\text{Pier C-2,3 \& A-2,3} = \frac{4 \times 1 \times 2 \times 6.25}{27} = 1.852 \text{ ycd.}$$

$$\begin{aligned} \text{Wall on top of footing} \\ &= (2 \times 1.5 + 2 \times 1.33) + 4(4-1) \times 1 \times 6.25 / 27 = 4.088 \end{aligned}$$

$$\begin{aligned} \text{Wall} &= (6 \times 12.67 \times 7.5 \times 1 - 3.37 \times 1.5 - 10 \times 1 \times 1.5 + 1 \times 1.5 \times 10) \times 1/27 \\ &= (570.15 - 2.685 - 5.0 + 5) \times 1/27 = 21.012 \text{ ycd} \end{aligned}$$

Total vol of conc. for

$$\text{Foundation} = 47.609 \text{ say } 47.7 \text{ ycd.}$$

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Form work for foundation concrete.

$$\text{TYPE "C"} - 2(5+5+28) \times 1.25 = 95 \text{ ft}^2$$

$$\text{TYPE B AND A} - 6 \times 16 \times 1.25 = 120 \text{ ft}^2$$

Pier - A-1, A-4, C-1, C-4

$$= 4(2 \times 2 + 2 \times 1.84) \times 6.25 = 192 \text{ ft}^2$$

$$\text{Pier A-2, 3, C-2, 3} = 4(2 \times 2 + 2 \times 1) \times 6.25 = 150 \text{ ft}^2$$

$$\text{Pier B-1, B-4} = 2(2 \times 2 + 2 \times 1.33) \times 6.25 = 83.25 \text{ ft}^2$$

Form work for wall.

$$\begin{aligned} \text{Line 1} \quad & 2 \times 8.67 \times 6.25 + 2 \times (1.33 + 1.33) \times 6.25 + 6 \times 7.5 \times 2 \\ & = 108.375 + 33.25 + 90 = 231.625 \approx 232 \text{ sf} \end{aligned}$$

$$\text{Line 4} = 232 \text{ sf}$$

$$\begin{aligned} \text{Line A} \quad & = 2 \times 2 \times 1.17 \times 6.25 + 3 \times 2 \times 2 \times 6.25 + 12.67 \times 2 \times 3 \times 7.5 \\ & - 5.37 \times 2 \times 1.5 - 2 \times 1.5 \times 10 + (1.5 + 1.5) \times 10 \\ & = 29.25 + 75 + 570.15 - 5.37 = 669.03 \end{aligned}$$

Say 670 sf

$$\text{Line C} = 675 \text{ sf}$$

$$\text{Total Quantity} = 2217.25$$

Say 2218.0 sf

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$$\text{Concrete for the slab} = 50.67 \times 20.67 \times .67 / 27$$

$$= 26 \text{ yd.}$$

$$\text{Concrete pad} = 7.5 \times 11.5 \times .5 + 12.75 \times 7.5 \times .5 + 2 \times 4.5 \times .5$$

$$+ 1.5 \times 4 \times .5 + 2 \times 1 \times .5$$

$$= 43.125 + 47.8125 + 4.5 + 3 + 1 = 99.4375$$

$$\text{Concrete in cubic yds} = 99.4375 / 27 = 3.69 \text{ yd}$$

$$\text{Additional form work} = (23+15) \times .5 + (25.5+15) \times .5 + (4+9) \times .5$$

$$+ (3+8) \times .5 + (4+2) \times .5$$

$$= 19 + 20.25 + 6.5 + 5.5 + 3 = 54.25 \text{ sf}$$

Concrete Pad on grade.

$$\textcircled{1} 6 \times 4 \times .5 / 27 = .45$$

$$\textcircled{2} \text{ Driveway Slab } 12 \times 8 \times .67 / 27 = 2.382$$

$$\text{Total } \underline{2.832 \text{ yd.}}$$

SUMMARY

$$\text{Concrete infoundation} = 48.0 \text{ cu yd.}$$

$$\text{Formwork} = 22.2 + 55 = 2273 \text{ sf}$$

$$\text{Concrete slab.} = 26 + 3.7 = 29.7 \text{ cubic yds.}$$

$$\text{Outside conc. pad} = 2.85 \text{ yd.}$$

$$\text{REINFORCING} = 81.0 \times 110 = 8910 \text{ lbs.} \approx 9000.00$$

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Crushed stone Backfill under slab (10" thick)

$$= 50.67 \times .84 \times 20.67 / 27 = 32.58 \approx 33 \text{ cyd.}$$

$$\text{Vapor Barrier} = 50.67 \times 20.67 = 1047.35 \text{ sft} \approx 1050 \text{ sft}$$

$$\text{Backfill} = 506 - 48 - 33 - 3 = 422 \text{ cu yd.}$$

Concrete Pipe Bollard 2 req.

6" Φ filled with conc. - 8' long sch 40.

Concrete Pole 1'-0" 6'-6" deep

$$\text{Perimeter rigid Insulation} = 3.5 \times 2(51 + 21) = 504 \text{ sft}$$

$$14 \text{ G. Galvanized Metal strip} = 144 \text{ ft}$$

$$\frac{1}{4} \\ 4 \\ \frac{1}{2}''$$

Embedded Metal plate with stud anchor - $\frac{3}{8}$ " PL with holes

$$= 10 \times 2 \times 15.3 = 306 \text{ lbs.}$$

$$\frac{1}{2} \Phi - 8'' \text{ long stud anchor} = 16 \text{ nos.} \quad = 8 \text{ lbs.} = 314$$

Anchor bolts with heavy hexagonal nuts and washer

$$5/8'' \Phi - 20 \text{ nos} - \text{Length} - 1'-3\frac{1}{2}'' \quad W = 1.44 \times 20 = 29 \text{ lbs}$$

$$3/4'' \Phi - 16 \text{ nos} \quad \text{length} - 1'-10\frac{1}{2}'' \quad W = 2.91 \times 16 = 47$$

Tot =

$$\frac{76 \text{ lbs.}}$$

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PROJECT LORING AFB
SUBJECT PROCESS BUILDING
QUANTITY ESTIMATE

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$$\begin{aligned}\text{CURING AREA} &= 2273 + 50.67 \times 20.67 + 6 \times 4 \\ &\quad + 12 \times 8 \\ &= 2273 + 1048 + 24 + 96 = 3441.0 \text{ sft.}\end{aligned}$$

GROUTING UNDER BASE PL.

1" Thick 10" col. base.

$$\text{Total area} = .84 \times 1 \times 10 = 8.4 \text{ sft.}$$

$$\text{EXPANSION ANCHOR. - NO.} = \frac{(2 \times 52 + 2 \times 22)}{2} = 74.$$

$$\text{PERIMETER FLASHING} = 2 \times 53 + 2 \times 23 = 152 \text{ FT.}$$

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UNIT PRICE BACK-UP

J:010000.20:WP:FTA:FTA-Cost.Est:mm
12:14:94:08:49

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PROJECT Loring AFB DU-8
 SUBJECT Pilot Study Design
 Cost Estimate - Cost Development

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4" Flexible Hose

'94 Means 016 420 3270 Discharge hose 4" ϕ @ \$90/month/50' length

$$\$90 \times 12 \text{ months} / 50 \text{ PE} \times .929 = \$20.07 / \text{LF}$$

3/8" Check valve

'94 Means 151 980 5720 3/8" size @ \$80.95/EA

$$\$80.95 / \text{EA} \times .929 = \$75.20 / \text{EA}$$

3" Ball valve

'94 Means 151 975 1300 3" Ball valve @ \$144. - /EA

$$\$144. - \times .929 = \$133.78 / \text{EA}$$

3/8" x 1" Reducer

'94 Means 151 454 6560 Use 1-1/2" reducer @ same cost = \$217.50

$$\$217.50 \times .929 = \$202.06$$

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PROJECT Loring RFB 02-8
 SUBJECT Pilot Study Design
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2" x 3" PVC PIPE

'94 Means 026 804 0040 2" Primary @ \$4.24/LF
 '94 Means 026 804 1120 3" Secondary @ \$5.19/LF

$$\text{Total} = 7.43 + 30\% \text{ Specialized labor} = 12.26 \times .929 = \$12.26/LF$$

2" x 3" ELBOW

'94 Means 026 804 0110 2" Primary @ \$55.50/EA
 '94 Means 026 804 1230 3" Secondary @ \$69.00/EA

$$\text{Total} = \$124.50 + 30\% \times .929 = \$161.85/EA$$

2" x 3" Tee

'94 Means 026 804 0200 2" Primary @ \$64.00/EA
 '94 Means 026 804 1270 3" Secondary @ \$89.50/EA

$$\text{Total} = 153.50 + 30\% \times .929 = \$183.50$$

PROJECT Loring AFB
 SUBJECT Process Building
 Development of unit price
REF.
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In general Means Heavy Construction Cost Data is used to develop the cost. The costs are adjusted to suit the local condition and the quantity.

A) Structural steel—

 051 - 255 - 0010
 Page 161.

 Unit price including overhead
 and profit = \$1375 per ton.

Quantity is small and the place is quite north it is

increased by 10% Final cost/ton = $1375 \times 1.1 = 1513/\text{Ton}$

B) Sag rod — 051 - 230 - 1300.

Use the same price as shown for $3/4\phi$ rod = 2.82 / lbs.

C) Standing seam Metal roof.

 Bottom liner 22g. $1\frac{1}{2}$ " deep \$ 1.21/sft
 Page 163 — 053/100/2100

 Insulation rigid $1\frac{1}{2}$ — R6.57 1.29/sft—
 072/100/0540

vapor barrier \$14.70/170 sft .25/sft—

 Roof 26 gage.
 93 means — 174 074/107/0300

 1.89.
 4.64

PROJECT Loring AFB
 SUBJECT Process Building
Development of Unit Price

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From previous page — \$ 4.64

Painting both side — 1.00

5.64.

Because of remoteness add 10% = $1.1 \times 5.64 = 6.20$.

According to M.J. LUNDY Associate from Telephone enquiry
 cost / sft with Unionized Labor = 9.10

d) Metal Siding

V-beam — 229 2.44

Insulation $1\frac{1}{2}$ - R 6.5 — 1.71

liner 24g . 2.36.

6.5

Add for dist. 10% etc = .65

According to the Telephone conversation with
 M. Lundy of M.J. Lundy Associate cost of the
 metal siding — \$ 8.50 sqft.

7.15

say \$ 7.2 / sqft -

e) Louver - 4'-0" x 4'-0"

DOOR - 5' x 7'-0" double = 600.
 081 | 114 | 0830

Garage Door

083 | 732 | 0100 use prior for 10' x 10' 1275.

Vendors quote — \$ 2600.00

F) Flashing - 051/235/3300 — 4.92

G) Gutter — enamelled — \$ 4.35 / FT (051-235-4500)
down spout — 4" dia — \$ 2.91 / FT. (076-201-4900)

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PROJECT Loring AFB
 SUBJECT Process BLDG
Development Unit for ice

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2 sitework

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a) clearing & Grubbing — 4300 sft \approx .1 acre
 021 / 104 / 010 = 2700 / acre.

b) Excavation —

022 / 254 / 0300 — cost per cubic yard = 6.15
 For Till add 20% = $\frac{1.23}{7.38}$

Use 200'-0 haul use excavation \$ 8.00/cyd.

c) Backfill — Backfill and Compaction:

hauling 200' and dumpin — 6.65 —————→ 022 / 254 /
 compaction — 1.56 3060
 3" lift 3 passes
 (022 / 226 / 8250) 8.21 Use \$ 9.00./cyd.

d) Crushed stone backfill
 10" deep

022 / 300 / 200

8.56 / sq yd.
 use \$ 9.0

e) Perimeter insulation —

Polystyrene Molded bead board 1" Thick = \$.62 / sft
 072 / 109

f) vapor Barrier.

Polyethylene Vapor Barrier .008" Thick = 11.85 / square
 use 12
 071 / 922 / 1000 Page 166 (1993)

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PROJECT Loring AFB
SUBJECT Process Building
Development of Cost

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3. Concrete -

033/126/0300

Cost of concrete 4000 psi - 55 /cyd.

Transportation

- 10 /cyd

Placing, - Crane & Product

36.50

033/172/5000

101.50.

Formwork 2 use.

031/182/2050

- 5.40 /sf

curing

- 3.28 /sf.

Reinforcing - $48 + 29.7 + 2.85 = 80.55 \text{ cyd.}$

Average use \$ 0.60 per/lbs.

Slab on grade steel trowel finished

- $55 + 10 = 65$

Placing

033/172/4400

27

\$ 92

Steel trowel finish.

\$ 1.72 /sf-

Growth 1" thick cost

12.20 /sf.

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PROJECT LORING AFB
SUBJECT

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UNIT. PRICE
FROM MEANS - 033/156/0300.

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1" Thick nonshrink gaut = \$ 11.10/sft.

ANCHOR BOLTS

MEANS 031/110/0250

5/8" ϕ - 18" Lg \$ ⁰⁵⁰⁰ 6.15

3/4" ϕ - 24" Lg \$ 8.20

EXPANSION ANCHOR 3/8" ϕ

MEANS 050/520/0400 — 4.64 EA

GUTTER —

051

Roll-Door SALES

481 HINMAN AVENUE
BUFFALO, NY 14216
877-1515
877-4527 FAX

FAXSIMILE COVER SHEET

TO: Mr. Pat

DATE: 12/7/94

FROM: _____

RE: _____

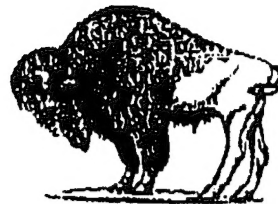
856-2545

Here are pictures you requested

22 ga installed - free mounted steel 2600" approx

Thank you

Bob Moeschler



THE COMPLETE GARAGE DOOR CENTER
SALES - PARTS - SERVICE



INSULATION PROVIDES full
thermal protection. Great
also available in 22, 20,
18 Ga and 9.5.
ALUMINUM with polyester

